# Discovery of Helium Enhanced Cool Bright Stars

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A team of scientists from the **Indian Institute of Astrophysics (IIA)**, an autonomous institute under the Department of Science & Technology (DST) studied numerous stars of Omega Centauri cluster and **discovered He-enhanced cool bright stars among the metal-rich sample of the cluster.** This work, a result of the spectroscopic survey conducted of this cluster, determines the He-abundance of these stars for the first time and has been published in 'The Astrophysical Journal'.

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Globular clusters are the stellar systems with **millions of stars formed from the same gaseous cloud.** Hence, usually, the stars formed will be homogeneous in their chemical composition of elemental abundances. But, there are clusters which deviate from this norm. One is being **Omega Centauri, the brightest and the largest globular cluster in our Galaxy, the Milky Way. The different stars of Omega Centauri do not show the same metal content, a parameter that indicates its age, but a large range in it.** Due to the anomalous elemental abundances, the formation scenario may be different from normal. **Normally, the abundances are derived using the assumption that He is one-tenth of the H-abundance.**

Though there are estimations of He-enhancement in the H-core burning main-sequence stars (like Sun) of Omega Cen, this is the first-ever spectroscopic determination of He-abundance in Omega Centauri. **The study provides a very important clue for the origin of the He-enhanced population establishing that these are the second generation of stars formed from the metal-rich and He-enhanced material from the first generation of stars.** And, also that the He-enhanced main-sequence stars evolve to the metal-rich He-enhanced cool bright stars.

While in most stars, H is the most abundant element, **if the abundance of H is reduced, correspondingly He abundance increases because the sum of H and He is a constant**, and the other heavier elements are in traces. The team found that the H-atomic spectral lines are very strong in the spectra of stars, and the reliable measurement of abundance was not possible from such lines. Hence, **IIA team used a novel technique that adopts model atmospheres with differing He/ H ratio and the predicted light from these models was matched with observed light in neutral magnesium (Mg) atomic line and that in MgH molecular band in the observed high-resolution spectra to derive the star’s actual H/ He ratio which measures the amount of He.** In all the previous studies, the analyses were carried out assuming the normal H-abundance like for Sun (He/ H=0.1).